FCC NTSC ENGINEERING DATABASE CORRECTION SHEET

TO: Victor Tawil

FROM: Linda Sullivan, **Region** 10
Telephone: 401-455-9100

RE: **FCC NTSC Engineering Database**

In connection with the Broadcasters' campaign to evaluate and to prepare comments on the FCC's DTV allotments/assignments proposal, the Regional Coordinating Teams are verifying the accuracy of the FCC's NTSC Engineering Database. Please confirm that the following information contained in the FCC NTSC Database is correct for your station:

		Check Here if Correct
Station Call Sign:	_____	✓
Channel:	_____	✓
Power:	_____	✓
Antenna Height:	_____	✓
RCAMSL:	_____	✓
Transmitter Location:		
Latitude:	_____	✓
Longitude:	_____	✓
Directional Antenna:	_____	✓
Reference Angle:	_____	✓

Please provide any necessary corrections in the spaces below:

Station Call Sign:	_____
Channel:	_____
Power:	_____
Antenna Height:	_____
RCAMSL:	_____
Transmitter Location:	
Latitude:	_____
Longitude:	_____
Directional Antenna:	_____
Reference Angle:	_____

Statement of Professor Jerry A. Hausman

1. My name is Jerry A. Hausman. I am MacDonald Professor of Economics at the Massachusetts Institute of Technology in Cambridge, Massachusetts, 02139.

2. I received an A.B. degree from Brown University and a B.Phil. and D. Phil. (Ph.D.) in Economics from Oxford University where I was a Marshall Scholar. My academic and research specialties are econometrics, the use of statistical models and techniques on economic data, and microeconomics, the study of consumer behavior and the behavior of firms. I teach a course in "Competition in Telecommunications" to graduate students in economics and business at MIT each year. Competition among broadcast TV, cable providers, and DBS are among the primary topics covered in the course. In December 1985, I received the John Bates Clark Award of the American Economic Association for the most "significant contributions to economics" by an economist under forty years of age. I have received numerous other academic and economic society awards. My curriculum vitae is included as Exhibit 1.

3. I have done a significant amount of research in the telecommunications industry. I have published numerous papers in academic journals and books about telecommunications. I have also edited two recent books on telecommunications, Future Competition in Telecommunications (Harvard Business School Press, 1989) and Globalization, Technology and Competition in Telecommunications (Harvard Business School Press, 1993).

4. I have done research in the television industry over a long period of time. I first did research on DBS in the early 1980's when I served as a consultant to Sears and Comsat on the commercial viability of DBS. I have

continued to follow the DBS industry since that time. I have previously submitted Declarations to the Commission on behalf of DirecTV regarding the competitive impacts of policies affecting DBS. I have also studied competition between broadcast and cable television. I have submitted statements to the Commission and to the DOJ on competition in the television industry. I have served as a consultant for the Tribune company for over six years. Tribune owns a number of broadcast stations and also participates in the recently formed UPN broadcast network. During 1996 I testified before both houses of Congress on matters relating to the adoption of advanced television in the United States.

5. I have been involved in the mobile telecommunications industry since 1984 when PacTel began operation of its cellular network in Los Angeles. I have published a number of academic papers in this area. I have submitted numerous affidavits to the Commission regarding cellular and PCS. I spoke before the En Banc hearing held by the Commission in 1994 regarding PCS. I have also studied mobile telecommunications in a number of other countries including the UK, Germany, France, Spain, Sweden, Finland, Canada, Mexico, Columbia, New Zealand, Australia, Hong Kong, and Japan.

I. Summary and Conclusions

6. The current Commission proposal for early recovery and auctioning of spectrum in the channel 60-69 UHF range will raise significantly less revenue (on a net present value basis) than the alternative proposal of an auction of larger blocks of spectrum in fifteen years time. The reason for this result is that market outcomes from the PCS auctions demonstrate that the market places a significantly higher value on larger blocks of contiguous spectrum. My estimates demonstrate that the proposal to delay the auctions will lead to 2.3-10.6 times greater revenue because of the ability to sell large spectrum blocks.

7. The Commission plan will also lead to increased interference for existing broadcast stations. This increased interference will lead to a loss in consumer value for viewers of non-cable television. I estimate the loss in consumer value using econometric models of program viewing choice. In Boston for increased interference on one UHF channel, Channel 38, I estimate that the loss in consumer value is between 3.5 and 4.7 times higher than the revenue that the Commission would raise in an early auction of the spectrum. The loss in consumer value is likely to be significantly larger than the gain in consumer value from new services offered on the recovered spectrum during the transition period.

II. Spectrum Valuation and Commission Policy

8. Over the past few years Congress has directed the Commission to auction off spectrum for mobile telecommunications uses. The Commission has held highly successful auctions for both PCS spectrum and for ESMR spectrum. The results of these auctions provide potentially valuable economic information for future Commission auctions. Market transactions place an economic value on spectrum, because absent the ability of spectrum users to exercise market power, bidders who are willing to pay more for a given amount of spectrum place a higher economic value on the spectrum.[1] Consumers also benefit because by purchasing the services offered on the spectrum they are demonstrating that they place an economic value on the services they use. Indeed, decisions by the service providers which increase revenues will also lead to an increase in consumer welfare so that the overall value both to the economy and to consumers will increase.[2]

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[1] In this statement I will assume that Commission policy will be formulated so that successful spectrum bidders will not be able to exercise market power in terms of charging prices above the competitive level.

[2] Because of the presence of imperfect competition here due to the substantial amount of fixed costs for most telecommunications services, the "invisible hand" theorem of economics does not necessarily apply. However, for a given investment expenditure in fixed costs, the profit maximizing

9. In the current Sixth Further Notice of Proposed Rulemaking (FCC 96-317, August 14, 1996) (NPRM) the Commission considers the efficient allocation of spectrum for the current NTSC system and for ATV. The NPRM states that the Commission is committed to the recovery of spectrum and to ensure that spectrum is used efficiently. (¶ 18) The NPRM proposes to relocate all future ATV service between channels 7 and 51, thus allowing the spectrum currently used by channels 2-4 and 5-6 for VHF TV and channels 52-69 currently used by UHF TV to be auctioned for other uses. The NPRM claims that a benefit of its relocation approach is that it may facilitate the early recovery of a portion of the spectrum, e.g. part of the 60 MHz of spectrum in the UHF block for channels 60-69. (¶ 25) However, the NPRM notes that this spectrum would not be cleared since broadcasters currently using channels 60-69, of which there are currently 97 broadcasters, would continue to use these channels during the transition and would be protected by the Commission from interference by any new licensees. (¶ 26) Moreover, under the NPRM's proposal, 37 broadcasters would receive ATV channels in the 60-69 range. Again, these stations would require protection from interference caused by new users of the spectrum.

10. I have serious reservations whether the proposal of the NPRM will lead to the most efficient use of the spectrum. Early recovery of smaller amounts of non-contiguous spectrum is likely to be a less economically efficient solution than later recovery of larger blocks of contiguous spectrum. Indeed, market evidence from the FCC auctions demonstrates this outcome. For instance, consider two alternative proposals. The first proposal waits for 15 years during the transition to ATV and then auctions off the 60 MHz of clear spectrum for current UHF channels 60-69. The second proposal, similar to the NPRM, auctions off say 12 MHz blocks of spectrum in the 746-806 MHz band which is equivalent to two UHF channels in the 60-69 block of channels. The question to be answered is whether larger blocks of

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service provider who will place the maximum value on the spectrum will also maximize the overall social welfare from the use of the spectrum.

contiguous spectrum are sufficiently more valuable to be worth waiting the extra 15 years for compared to getting some spectrum today and some more in the future, but with smaller blocks of spectrum.

11. To answer this question I need to make some assumptions which will permit quantification of the two ranges of proposals. I will assume that in the first proposal of 60 MHz of spectrum, that the Commission will decide to auction the spectrum in two 30 MHz blocks. In the second proposal I assume that the Commission auctions the spectrum in either six 10 MHz blocks or five 12 MHz blocks, part of which are sold at the beginning of the fifteen year period and part of which are sold at the end of the fifteen year period, depending on spectrum availability. I change the relative proportions of Year 1 and Year 15 spectrum to analyze how this factor affects the results. Since I need to compare revenue today with revenue 15 years from now, I use a 4% real discount rate to calculate present discounted values.[3] I now turn to recent market data which allows me to compare these two proposals.

12. The market data I use to estimate the relative value of the spectrum are the auction values for the broadband PCS spectrum for blocks C, D,E, and F. Each of these blocks had as its geographical region the BTAs so that this attribute is the same across blocks. The attribute which differs is the amount of spectrum: the C block has 30 MHz while the D,E,and F, blocks each have 10 MHz. The C block spectrum achieved a much higher auction value than the D,E, and F block have to date. I have estimated regressions to consider whether other factors beyond the amount of spectrum auctioned, e.g. BTA population, may explain the different values received, but I do not find any to be statistically significant. Furthermore, the auctions were only about 6 months apart and no significant change has occurred in market

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[3] Alternatively, the analysis could be done in terms of nominal interest rates with no change in the results. The real rate of interest used here is likely to be conservative, given the current 10 year government nominal bond rate of 6.3% and the 30 year bond rate of 6.5% which lead to a real interest rate estimate of about 3.5%.

expectation over the period. Lastly, the universe of eligible bidders for the D,E, and F blocks was considerably larger than for the C block since in region cellular companies were permitted to bid for the smaller D and E blocks, but not for the C blocks (or for the F blocks). Thus, the difference in bids should reflect the difference in spectrum value as a function of the amount of spectrum being auctioned.

13. The closest comparison may be the C block results to the F block results, given that the eligibility rules and payment rules are similar. The amount received for the C block auction is $10.1 billion while the F block auction total is about $280 million. On a per MHz (and per pop) basis, the result is that the C block spectrum sold for a ratio of 12.0 times higher than the F block spectrum. The D and E block spectrum prices are higher than the F block spectrum, probably because the current in region cellular companies were eligible to bid for the D and E blocks, but were not eligible to bid for the A,B,C, and F blocks. However, the difference in price is still substantial with the C block spectrum price on a per MHz basis being 5.8 times greater than the average of the D,E, and F block spectrum. Thus, for similar geographical regions, market data demonstrates a significant premium to larger blocks of spectrum.

14. To evaluate the two television spectrum auction proposals, I now calculate the present discounted value of the Commission auctioning off a given amount of the UHF spectrum from channels 60-69 (60 MHz) in 10 MHz blocks now and then auctioning off the remainder of the spectrum in fifteen years.[4] I compare the results with the Commission auctioning off two 30 MHz blocks in fifteen years. The results are in Table 1:

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[4] Since UHF channels are 6 MHz, 12 MHz blocks may yield a more realistic estimate. However, I must interpolate to do this calculation which I do below.

Table 1: Net Present Value of Estimated Auction Returns

Two 30 MHz blocks versus Six 10 MHz blocks

30 MHz blocks[5]	10 MHz blocks now	F value/Ratio		D,E,F value/Ratio	
$11.2B	0	$0.9B	12.0	$1.9B	5.8
$11.2B	1	$1.1B	10.6	$2.2B	5.1
$11.2B	2	$1.2B	9.5	$2.5B	4.6
$11.2B	3	$1.3B	8.9	$2.7B	4.1
$11.2B	4	$1.4B	7.9	$3.0B	3.8
$11.2B	5	$1.6B	7.2	$3.2B	3.5
$11.2B	6	$1.7B	6.7	$3.5B	3.2

The results in Table 1 demonstrate that significantly more value would be created if the Commission waits and auctions off larger spectrum blocks after clearing the UHF spectrum of the 60-69 channels. For instance, the second line of Table 1 considers the situation where the Commission auctions off one 10 MHz block now and auctions off the remaining five 10 MHz blocks in fifteen years time. This proposal would generate a net present value (NPV) of $1.1 billion based on the F block PCS results or $2.2 billion based on the combined D,E, and F block PCS results. These sums are much lower than the NPV of $11.2 billion raised when the two 30 MHz block bands would be auctioned in fifteen years time. Indeed, the ratio of proceeds varies between 5.1-10.6 times higher for waiting and selling the larger blocks. Even in the situation where the Commission could auction off now 40 of the 60 MHz which will eventually be available, the ratios are still in the range of 3.8-7.9 for waiting. Thus, significantly higher value of the spectrum will be achieved in terms of net present value by the Commission waiting and selling off the larger blocks in the future.[6]

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[5] Assumed to be auctioned in 15 years. Real interest rate of 4% used.

[6] A concern might arise that I have not taken account of the increase in consumer welfare (consumers surplus) during the 15 year waiting period. However, since the effect of a new service on consumer welfare is directly proportional to revenues, which in turn determine profits and the value to the

15. An alternative valuation comparison arises if I assume that the Commission will auction off five 12 MHz blocks, rather than six 10 MHz blocks. These size blocks are more consistent with the 6 MHz band used by a given UHF channel. I thus calculate the present discounted value of the Commission auctioning off a given amount of the UHF spectrum from channels 60-69 (60 MHz) in 12 MHz blocks now and then auctioning off the remainder of the spectrum in fifteen years.[7] I compare the results with the Commission auctioning off two 30 MHz blocks in fifteen years. The difficulty here is that no market observations exist for auction values of 12 MHz blocks. Interpolation of actual auction results is required. To be conservative, I use the interpolation techniques which leads to a maximum value of the five 12 MHz blocks. The results are in Table 2:

Table 2: Net Present Value of Estimated Auction Returns

Two 30 MHz blocks versus Five 12 MHz blocks

30 MHz blocks[8]	12 MHz blocks now	F value/Ratio		D.E.F value/Ratio	
$11.2B	0	$3.5B	3.2	$4.3B	2.6
$11.2B	1	$4.1B	2.8	$4.9B	2.3
$11.2B	2	$4.6B	2.4	$5.6B	2.0
$11.2B	3	$5.2B	2.2	$6.3B	1.8
$11.2B	4	$5.7B	2.0	$7.0B	1.6
$11.2B	5	$6.3B	1.8	$7.7B	1.5

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bidder for the spectrum, inclusion of consumer value will lead to qualitatively the same results. Indeed, the inclusion of consumer value would usually increase the ratios leading to an even stronger conclusion that the better policy is to wait and auction off the larger blocks of spectrum in the future.

[7] Since UHF channels are 6 MHz, 12 MHz blocks may yield a more realistic estimate. However, I must interpolate to do this calculation.

[8] Assumed to be auctioned in 15 years. Real interest rate of 4% used.

The results in Table 2 again demonstrate that significantly more value would be created if the Commission waits and auctions off larger spectrum blocks after clearing the UHF spectrum of the 60-69 channels even under the very conservative valuation approach that I use here. Again, the second line of Table 2 considers the situation where the Commission auctions off one 12 MHz block now and auctions off the remaining four 12 MHz blocks in fifteen years time. This proposal would generate a net present value (NPV) of $4.1 billion based on the F block PCS results or $4.9 billion based on the combined D,E, and F block PCS results. These sums are again much lower than the NPV of $11.2 billion raised when the two 30 MHz block bands would be auctioned in fifteen years time. Indeed, the ratio of proceeds varies between 2.3-2.8 times higher for waiting and selling the larger blocks. Even in the situation where the Commission could auction off now 36 of the 60 MHz which will eventually be available, the ratios are still in the range of 1.8-2.2 for waiting. Thus, significantly higher value of the spectrum will be achieved in terms of net present value by the Commission waiting and selling off the larger blocks in the future.

16. The estimates demonstrate a significant increase in spectrum value when the Commission waits and auctions off larger blocks of clear spectrum. However, a further reason exists which would likely cause an even greater reward for waiting. The calculations in Table 1 and Table 2 assume that the same proportion of spectrum will be available in each BTA. However, spectrum in densely populated BTAs is much less likely to be available early because more UHF stations, both NTSC and ATV channels, are proposed to be located in these BTAs. The auction results demonstrate that auction values depend in an important manner on BTA population. For instance, the D block for Boston has a bid of $6.5 million at $1.58 per pop. Portland ME has a bid of $0.12 million at $0.27 per pop for a valuation difference of 5.9 times. Since the Boston DMA has 4 UHF channels in the 60-69 band, the amount of spectrum available for an early auction will be much less than in Portland which has 0

UHF channels in the 60-69 band. Thus, the differences which I have estimated are likely to be much larger when account is taken of the specific geographical location of UHF channels in the 60-69 band.

17. To take into account the differing amounts of spectrum available across DMAs for auction immediately under the Commission plan, I asked MSTV, using the FCC proposed plan, to determine the BTAs in which spectrum could be auctioned off immediately in 12 MHz blocks. About 42.8% of BTAs meet the criterion of having at least one 12 MHz available for immediate auction, i.e. 211 out of 493 BTAs.[9] However, the available spectrum for immediate auction covers only 19.7% of the US population, which demonstrates that the BTAs that would permit immediate spectrum auctions are in the less densely populated geographic areas and thus less valuable BTAs for spectrum auctions. For example, when I consider the top 30 BTAs by population which comprise almost 50% of the US population, I find that only 16% of the spectrum would be available for immediate auction. Indeed, in the top 12 BTAs only one 12 MHz block would be available for immediate auction. Thus, the likely revenues raised from an immediate auction will be considerably lower when calculated on a BTA specific basis, rather than on a national basis, because of the heavy usage of the 60-69 band in highly populated BTAs which generate high spectrum revenues at auction.

18. Using the same estimation methodology used in Table 2, I calculated the expected auction values for the available spectrum based on the observed PCS auction values in the same BTAs. For the remaining spectrum, I assumed that it would be auctioned in 12 MHz blocks in fifteen years.[10] I then computed the net present value of this proposal versus the alternative

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[9] Under the Broadcasters' Modified Table plan which attempts to minimize interference, 90 BTAs would have 12 MHz of spectrum available for immediate auction.

[10] It would be very unusual for the Commission to adopt different spectrum allocation blocks across different BTAs in the future.

proposal of waiting 15 years and auctioning off two 30 MHz blocks of spectrum. Thus, the results are similar to Table 2, but the results are estimated on a BTA by BTA basis, rather than a nationwide basis. The results are given in Table 3:

Table 3: Net Present Value of Estimated Auction Returns
Two 30 MHz blocks versus Five 12 MHz blocks
Values Estimated on a BTA Specific Basis

30 MHz blocks[11]	% of 12 MHz Blocks Available Now	F value/Ratio	D,E,F value/Ratio
$11.2B	36.9%	$4.0 B 2.8	$4.8 B 2.3

Based on the F block PCS auction value, I find that the NPV of the second proposal of an immediate auction of available spectrum is $4.0 billion compared to $11.2 billion from the first proposal of auctioning off 30 MHz blocks in fifteen years so that the ratio of NPVs of waiting fifteen years to auction off the spectrum is 2.8 times higher (180% more) than the immediate auction proposal. Similarly, if I base the immediate auction proposal on the combined D,E, and F PCS auctions, I find that the BTA by BTA auction would raise $4.8 billion in NPV. Thus, the ratio of NPVs of the fifteen year proposal to the immediate auction proposal is 2.3 higher (130% more). Compared to Table 2 on a revenue basis, the effect of a BTA analysis is quite close to auctioning off one 12 MHz block in each BTA now and waiting 15 years to auction off the other four 12 MHz blocks. I note that the ratios would increase significantly if I used the Broadcasters' plan rather than the Commission plan to determine the amount of available spectrum for immediate auction or if I used a less favorable valuation interpolation approach for the 12 MHz blocks.[12] However, even taking a quite conservative approach, I find

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[11] Assumed to be auctioned in 15 years. Real interest rate of 4% used.

[12] The broadcaster plan would have only about 65% as much spectrum available for immediate auction. The value of the early auction would decrease by more than 35% because the non-available spectrum would be in more

that between 2.3-2.8 more revenue on a NPV basis will be raised if the larger blocks are auctioned off at the end of a fifteen year period.

19. Thus, when I consider the expected auction results on a BTA by BTA basis, the immediate auction proposal does even less well than in Table 2 compared to the fifteen year auction proposal. This result is to be expected because the BTAs where spectrum will be available for immediate auction are less densely populated BTAs where the use of the 60-69 channel block for current UHF broadcasts and for future ATV broadcasts is significantly less than in more densely populated BTAs. Thus, I conclude that the immediate auction proposal will raise significantly less revenue, on a net present value basis, than waiting for fifteen years and auctioning off the entire 60-69 block in two 30 MHz blocks. This conclusion is based on observed market outcomes from the recent PCS auctions, which provide a source of spectrum valuation which the Commission should find extremely useful.

III. Consumer Welfare and Commission Policy

20. Consumers value broadcast television, even though they receive it for "free". Consumers spend a significant proportion of their leisure time watching broadcast television. Considered from a slightly different perspective, many television viewers pay a significant amount each month, on average $23, for the additional viewing options from networks carried on cable.[13] The current Commission proposal would decrease the consumer value of broadcast television, because it would create interference for a significant number of television stations. MSTV estimates that this increased

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densely populated BTAs.

[13] Average basic rate for year end 1995 from Paul Kagan Associates, Cable TV Investor, May 21, 1996.

interference would affect about 150 stations.[14] Since the interference is typically in large urban areas, a significant number of viewers will be adversely affected by the Commission plan.

21. Competition would also be affected adversely by the Commission plan. The increased interference would disproportionately affect UHF channels in large urban areas. These UHF channels carry the new networks, Warner and the UPN network. Since network broadcasts depend on large viewership to attract sufficient advertising revenues to finance their program production, a significant decrease in viewership would have an important effect on their ability to finance competitive programming. Furthermore, advertising revenues increase in a disproportionate manner (nonlinearly) with viewership. Thus, a given program with, say, two times the audience of another program holding other factors such as demographics equal, will typically receive more than two times the advertising revenue. Thus, increased interference which will decrease audiences in major metropolitan areas for the new networks is likely to decrease competition significantly.[15]

22. I attempt to estimate the decrease in consumer value by calculating the effect of the Commission plan in the Boston DMA. According to the FCC table, Channel 38, WSBK, in Boston will lose about 22% of its service area and 9.8% in population because of increased interference. Channel 38 is the UPN network affiliate in Boston, and it also televises the Boston Bruins (National Hockey League) and Boston Celtics (National Basketball Association). Thus, Channel 38 is the second highest watched UHF channel in Boston, after Channel

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[14] Cable viewers would not be affected by the increased interference. However, cable penetration is only about 62% with less than 50% of television sets hooked up to cable. I take account of cable penetration in my subsequent calculations.

[15] For instance, WGN, which reaches about 2/3 of cable homes, receives a significantly lower per viewer advertising rate than does TNT, which reaches about 96% of cable homes, for NBA telecasts. This difference is emphasized further by the superior product (Michael Jordan and the Chicago Bulls) versus the average NBA game which TNT telecasts.

25, WFXT, the Fox affiliate. I use the average ratings for the November 1995, February 1996, and May 1996 sweep periods for the entire sign on to sign off period and estimate the loss in consumer value from the unavailability of Channel 38 to non-cable televisions. The estimated amount is significant.

23. To estimate the loss in consumer value, I calculate the loss in consumer surplus using either a multinomial logit model or a nested logit model.[16] The decrease in consumer value is estimated from the decrease in consumer surplus from the decreased availability of Channel 38 to viewers.[17] Based on the multinomial logit model I estimate that Channel 38 provides 6.2% of the total consumer value from broadcast television in the Boston DMA. Using the nested logit model I estimate that Channel 38 provides 4.6% of the total consumer value. To express these estimates in dollar values I need to know the total consumer value of broadcast television. No estimate of this value exists, to the best of my knowledge. However, I can estimate a value in the following way. I need to know the reservation (virtual) price for television--the most that a household would be willing to pay to receive broadcast television.[18] To be conservative I will use $40.[19] The value of

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[16] The models are discrete choice models which are often used in econometrics. The multinomial logit model treats each station in a symmetric manner. The nested logit model permits a more flexible choice pattern for viewers. For the nested logit model I use three groups of stations: major networks, public television, and remaining channels. Thus, for the nested logit model I allow the major networks to be closer substitutes for each other than are the public TV and UHF stations.

[17] The exact formulae used can be found in J. Hausman, G. Leonard, and D. McFadden, "A Utility-consistent, Combined Discrete Choice and Count Data Model", Journal of Public Economics, 56, 1995, p. 9, equations (2.1.9) and (2.1.10).

[18] The methodology behind this calculation is explained in J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition, in T. Bresnahan and R. Gordon, The Economics of the Consumer Price Index, Univ. of Chicago Press, 1996.

[19] I derive the $40 estimate by noting that cable penetration is about 62% at the current average price of $23. Using the cable price of $23 and a linear demand curve with the minimum price elasticity leads to an estimate of the virtual price of $45.92 per month. However, ratings for the broadcast stations are significantly higher than for cable. Thus, the virtual price for broadcast television would be higher than my estimate derived from current

Channel 38 to a household under the multinomial logit model is $1.24 per month.[20] An estimate based on the nested logit model is $0.92 per month. Using these estimates and the 9.8% population interference number, the lost consumer value in the Boston DMA is between $2.21 million to $2.98 million per year. Over a fifteen year period, the net present value of the decrease in consumer value is between $24.6 million to $33.1 million. Thus, the loss in consumer value from the Commission plan is significant.[21]

24. The loss in consumer value far exceeds the expected amount the Commission could expect to receive from auctioning off a 12 MHz block of spectrum 15 years earlier under its plan, since the average value of the D,E, and F bands in Boston is about $7 million. Thus, consumers would be made worse off by the proposed Commission policy, even if they received the amount from the auction in place of being to receive Channel 38. The cost-benefit ratio is between 3.5 and 4.7 to 1, which demonstrates that even with a reasonable change in parameter values, the proposed Commission policy of early recovery of Channels 60-69 is not as good as waiting fifteen years to auction off spectrum and currently creating no additional interference for existing broadcast channels.[22] Furthermore, given the observed market results from the PCS auctions, benefit-cost ratios of these magnitude demonstrate that the lost consumers value from decreased broadcast television choice will likely be

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cable price and penetration. I use $40 to be conservative. Note that if I used a logit model for penetration, I estimate that 1% of households would continue to subscribe at a price exceeding $100 per month. Thus, this estimate would lead to a considerably higher virtual price.

[20] This estimate is reasonably close to the recent estimate using a multinomial logit model of $1.03 for a basic satellite channel by R. Crandall, and H. Furchtgott-Roth, Cable TV, Brookings 1996, p. 56. The ratings for Channel 38 are over 5 times higher than the highest rated basic satellite channel, so that a higher estimated value is to be expected.

[21] If the Boston results can be scaled up to a national level, the decrease in consumer value due to the Commission policy would lie in the range of $1.6 billion to $2.1 billion.

[22] To the extent that the Commission proposal would cause significantly more interference to ATV services that the alternative plan, these cost-benefit ratios would increase even more.

far greater than the consumer benefit from new services that would be offered on the recovered spectrum during the transition period.

J. A. Hausman Nov 20, 1996

Jerry A. Hausman

May 1996

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EDUCATION:

OXFORD UNIVERSITY
D. Phil. 1973 (Ph.D)
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THESIS: "A Theoretical and Empirical Study of Vintage Investment and Production in Great Britain," Oxford University, 1973.

FELLOWSHIPS, HONORS AND AWARDS:

Phi Beta Kappa
Marshall Scholar at Oxford, 1970-1972
Scholarship at Nuffield College, Oxford, 1971-1972
Fellow of Econometric Society, 1979.
Frisch Medal of the Econometric Society, 1980
Fisher-Schultz Lecture for the Econometric Society, 1982
John Bates Clark Award of the American Economic Association, 1985
Jacob Marschak Lecture for the Econometric Society, 1988
American Academy of Arts and Sciences, 1991.

EMPLOYMENT:

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1992-	John and Jennie S. MacDonald Professor
1979-	Professor, Department of Economics
1976-79	Associate Professor, Department of Economics
1973-76	Assistant Professor, Department of Economics
1972-73	Visiting Scholar, Department of Economics

VISITING APPOINTMENTS:

1986-87	Visiting Professor, Harvard Business School
1982-83	Visiting Professor, Harvard University Department of Economics

U.S. ARMY, ANCHORAGE, ALASKA

1968-70	Corps of Engineers

PROFESSIONAL ACTIVITIES:

Associate Editor, Bell Journal of Economics, 1974-1983
Associate Editor, Rand Journal of Economics, 1984-1988
Associate Editor, Econometrica, 1978-1987
Reviewer, Mathematical Reviews, 1978-1980
American Editor, Review of Economic Studies, 1979-82
Associate Editor, Journal of Public Economics, 1982-
Associate Editor, Journal of Applied Econometrics, 1985-1993
Member of MIT Center for Energy and Environmental Policy Research, 1973-
Research Associate, National Bureau of Economic Research, 1979-
Member, American Statistical Association Committee on Energy Statistics, 1981-1984
Special Witness (Master) for the Honorable John R. Bartels, U.S. District Court for the Eastern District of New York in Carter vs. Newsday, Inc., 1981-82
Member of Governor's Advisory Council (Massachusetts) for Revenue and Taxation, 1984-1992
Member, Committee on National Statistics, 1985-1990
Member, National Academy of Social Insurance, 1990-
Member, Committee to Revise U.S. Trade Statistics 1990-1992
Director, MIT Telecommunications Economics Research Program, 1988-
Board of Directors, Theseus Institute, France Telecom University, 1988-
Member, Conference on Income and Wealth, National Bureau of Economic Research, 1992-

PUBLICATIONS:

I. Econometrics

"Minimum Mean Square Estimators and Robust Regression," Oxford Bulletin of Statistics, April 1974.

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